

# Control System Design Guide and Functional Testing Guide for Air Handling Systems



## TECHNICAL REPORT

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***Prepared By:***

*Buildings Technologies Department  
Lawrence Berkeley National Laboratory*

Steve Selkowitz  
B90R3110  
1 Cyclotron Road  
E. O. Lawrence Berkeley National  
Laboratory  
Berkeley, CA 94720

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***Prepared For:***

Martha Brook,  
***Contract Manager***

Nancy Jenkins,  
***PIER Buildings Program Manager***

Terry Surles,  
***PIER Program Director***

Robert L. Therkelsen  
***Executive Director***

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# Preface

The Public Interest Energy Research (PIER) Program supports public interest energy research and development that will help improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

The Program's final report and its attachments are intended to provide a complete record of the objectives, methods, findings and accomplishments of the High Performance Commercial Building Systems (HPCBS) Program. This Commercial Building Energy Benchmarking attachment provides supplemental information to the final report (Commission publication # 500-03-097-A2). The reports, and particularly the attachments, are highly applicable to architects, designers, contractors, building owners and operators, manufacturers, researchers, and the energy efficiency community.

This document is the eleventh of 22 technical attachments to the final report, and consists of a research report:

- New Construction Design and Commissioning Reference Guide (E5P2.1T1d)

The Buildings Program Area within the Public Interest Energy Research (PIER) Program produced this document as part of a multi-project programmatic contract (#400-99-012). The Buildings Program includes new and existing buildings in both the residential and the nonresidential sectors. The program seeks to decrease building energy use through research that will develop or improve energy-efficient technologies, strategies, tools, and building performance evaluation methods.

For the final report, other attachments or reports produced within this contract, or to obtain more information on the PIER Program, please visit <http://www.energy.ca.gov/pier/buildings> or contact the Commission's Publications Unit at 916-654-5200. The reports and attachments are also available at the HPCBS website: <http://buildings.lbl.gov/hpcbs/>.

# Abstract

## **Control System Design Guide and Functional Testing Guide for Air Handling Systems**

As building systems grow increasingly complex and have tighter construction schedules, designers and commissioning providers need practical tools to help streamline the process and ensure performance. The *Control System Design Guide* and the *Functional Testing Guide for Air Handling Systems: From the Fundamentals to the Field* are two such tools.

The Control System Design Guide provides a toolbox of templates for improving control system design and specification. It provides recommendations for the control system design process, guidelines for control and monitoring points, and sample points lists for 11 different system configurations. The Functional Testing Guide for Air Handling Systems provides both a practical understanding of the fundamentals of air handling systems and a detailed explanation of functional testing benefits and field tips. The Functional Testing Guide also reviews the energy and performance implications of common problems and provides links to publicly available functional test procedures in the Commissioning Test Protocol Library (CTPL).

The Guides are available at [http://buildings.lbl.gov/hpcbs/Element\\_5/FTG/ftg-reg.php](http://buildings.lbl.gov/hpcbs/Element_5/FTG/ftg-reg.php)